

DETAILED ACTION

Response to Arguments

Claims 5-8, 10-14, 21-23 & 28-31 are pending examination as discussed below.

Upon consideration of the arguments presented in the Appeal Brief of 2/1/08, the arguments are found persuasive and therefore, the rejections of the pending claims have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made as discussed below.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 5-8, 10-14, 21-23 & 28-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding the limitation "an overdrive system", as presented in at least claims 28-31, no qualifying structural feature is disclosed in the instant specification as to what is defined as "an overdrive system". It is unclear what structurally is meant or being claimed by this limitation. Overdrive in terms of a transmission is a lower gear ratio. Since no transmission is claimed or disclosed, this definition is not being observed. Overdrive is also used to just to mean a set of gears assembled to transfer rotational motion. This is the definition used for the examination of the claims.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 28-31, 12 & 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,682,928 (Keith) in view of US Patent 5,951,177 (Schanke).

Keith teaches a method of manufacturing an electrode for a battery. The method comprises feeding a length of metal web into a dip-tank at a controlled speed using driven nip rollers (22, 24) that are located before the dip-tank (Fig. 1; Abstract, 2:18-40). The web is coated with an active material slurry and then pulled upward through a solidification chamber (Fig. 1 & 3; 3:1-4:15, 5:1-15).

While Keith teaches a metal web, Keith is silent to a solid metal foil. It is well known in the art that a metal foil is an equivalent structure to a metal web as a current collector or substrate for the active material. It would have been obvious to one skilled in the art at the time of the invention to substitute an equivalent metal foil structure for the metal web taught by Keith.

Keith is silent to winding the coated length onto a driven spool using an overdrive system with a slip clutch.

Schanke teaches a method of maintaining tension on a ribbon system (Abstract). A driven spool using an overdrive system with a slip clutch is used as the take up spool

(Fig. 1; 5:1-12). The slip clutch maintains the tension on the web material as it is taken up on the spool.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the electrode making process of Keith with the take up spool of Schanke to maintain a proper tension on the web during the take up process.

Regarding claims 12 & 13, the coating is removed from the web in the areas intended to for terminal tabs (4:5-65). The removing includes buffing the material off the terminal area. However, Keith is silent to vacuuming or sandblasting of the coating material as a removal means.

Sandblasting is a well-known method of removing unwanted material from a surface. The sandblasting provides a very clean surface with texture, which would create a desired surface for attaching another component. It would be obvious to one skilled in the art to use sandblasting as a means of removing the coating material in order to prep the surface for another process step. As for the vacuuming, it would be obvious to add a vacuum to the system to keep the unwanted material from contaminating other components of the apparatus or the product being produced.

3. Claims 5-8, 10 & 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,682,928 (Keith) in view of US Patent 5,951,177 (Schanke) as applied to claims 28-31 above and further in view of US Patent 6,280,879 (Andersen).

The teachings of Keith and Schanke as discussed above are incorporated herein.

Keith is silent to treating the grid with a primer solvent or to the composition of the primer.

With regard to claims 5, 6, 10 & 21, Andersen teaches that current collector foils can be protected from highly reactive and corrosive electrode and electrolyte materials by coating the current collectors with primer. The primer is composed of carbon black, a binder (PVDF or PVDF copolymers), and solvent (multiple solvents used in Examples II and III). It was shown that the primer resulted in good adhesion (5:27-6:23; 14:14-16). Thus, it would have been obvious to one of ordinary skill in the art to use the primer disclosed by Andersen in the process disclosed in by Keith in order to protect current collectors from reactive and corrosive materials and promote good adhesion.

With regard to claims 7 & 8, Andersen teaches an electrode paste having solvent in the range of 20-88% by weight, binder in the range of 1-10% by weight, active material in the range of 25-50% by weight, and carbon black as a conductive additive in the range of 2-10% by weight. PVDF is a preferred binder, and ketones, which include acetone, and N-methyl-pyrrolidone are preferred solvents. (Col. 7, ll. 17-65). Adjustment of the boiling point/evaporation rate of the solvent and the viscosity of the solvent are taught as critical, and thus it would have been obvious to one of ordinary skill in the art to use a combination of solvents to adjust various variables such as vapor pressure.

4. Claims 14 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,682,928 (Keith) in view of US Patent 5,951,177 (Schanke) and US Patent 6,280,879 (Andersen) as applied to claims 5 & 6, and further in view of US Patent 5,230,906 (Mueller) and US Patent 3,694,392 (Werner).

The teachings of Keith, Schanke and Andersen as discussed above are incorporated herein.

Keith, Schanke and Andersen are silent to the primer containing lithium polysilicate and carbon black.

Werner teaches a primer for increasing adhesion of a fluorocarbon polymer coating to a substrate. This primer contains lithium polysilicate, carbon black and water (1:42-48; Example 1) and is applied by known methods. Hot air is then applied to the coated web to dry the primer coat.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a primer containing lithium polysilicate, carbon black, and water as disclosed by Werner in the process disclosed by Keith, Schanke and Anderson in order to increase adhesion of the dip coated slurry to the current collector.

Keith, Schanke and Andersen are silent to the process of applying the primer by way of dip-coating and then sequentially pulling the web over a horizontal roller.

Mueller teaches applying a liquid material to a web by means of dip coating and then sequentially passing the coated web over a roller horizontally (Fig. 1; 4:53-55, 5:50-55). While Werner already teaches applying hot air to dry the coating, Mueller also

teaches using a heating device to dry the coated web. Using a heating device to dry the primer coat accelerates the drying process.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the electrode making process of Keith with the dip coating process of Mueller in order to pass the web through an accelerated drying process.

5. Claims 11 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,682,928 (Keith) in view of US Patent 5,951,177 (Schanke) and US Patent 6,280,879 (Andersen) as applied to claims 5 & 6, and further in view of US Patent 5,443,602 (Kejha).

The teachings of Keith, Schanke and Andersen as discussed above are incorporated herein.

Keith, Schanke and Andersen are silent to the web having masked areas that are intended for terminal tabs prior to primer treatment.

Kejha teaches attaching masking tape to the terminals of the current collector prior to further processing of the collector (3:45 - 4:30). The masking tape covers a portion of the web that should be protected from further coating processes. By making the area and then removing the tape, that area has not been treated by any of the coating steps and is in better condition for an action such as welding a terminal.

Regarding the order of the steps involved, Kejha teaches masking off an area of the collector to protect the surface from any subsequent coatings so a clean surface is

provided for further attachment means. Anderson teaches providing a primer coating on the collector to promote good adhesion.

Therefore, it would have been obvious to one skilled in the art at the time of the invention to mask off the areas of the collectors needing a clean coating free surface, as taught by Kejha, before coating the collector with the primer coating as taught by Anderson.

6. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,682,928 (Keith) in view of US Patent 5,951,177 (Schanke) and US Patent 6,280,879 (Andersen) as applied to claims 5 & 6, and further in view of U.S. Patent No. 5,385,761 (Iwanaga).

The teachings of Keith, Schanke and Andersen as discussed above are incorporated herein.

Keith, Schanke and Andersen are silent to sandblasting to remove the mask.

Iwanaga teaches sandblasting to remove the mask after the electrode has been coated (8:42-44). One of ordinary skill in the art would recognize that any abrading or polishing would remove the mask and any oxides that may have formed on the masked portion of the collector and would leave behind detritus. This detritus would adversely affect the joining of the current collector and terminal tab, thus requiring removal.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include an electrode cleaning step to remove the mask as taught by Iwanaga in the process as disclosed by Keith, Schanke and Andersen in

order to remove the mask and any oxides that may have formed so that good physical and electrical connections may be made.

7. Claims 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,443,602 (Kejha) in view of US Patent 4,254,191 (Kniazzeh) and US Patent 4,318,430 (Perman).

Kejha discloses a method of coating a current collector grid with cathode material so that the grid is embedded in the middle of the coating (Fig. 4; 2:5-7, 4:31-60). As shown in Fig. 4, a web (11), which may be a "desired current collector," travels into a dip tank (37) and vertically upward through a solidification chamber (43) using nip rollers (3:50-55; 4:46-56; 6:4-5). The speeds of all the components of the manufacturing process are synchronized and therefore controlled (7:59-61). Kejha teaches that the current collectors described in US Patent Application serial number 08/281,011 may be used in the Patent 5,443,602 invention. (See US Patent 5,750,289, child of application 08/281,011, Col. 3, ll. 48-56). The metal grids, expanded metal foils, perforated metal foils, and solid metal foils recited in instant claims 28-31 are encompassed by the current collectors disclosed in US Patent application serial number 08/281,011. As disclosed by applicants, these current collectors include two or three layers of different materials including a plastic film or net layer, and one or two metal layers on the surface of the plastic. Thus, the current collectors disclosed in US Patent Application serial number 08/281,011 include a metal layer, which would be in the form of metal grid, expanded metal foil, perforated metal foil, or solid metal foil.

Kejha is silent to using driven nip rollers before the dip coating.

Perman teaches a method of making electrodes for batteries using driven nip rollers before the coating step (Fig. 2; 3:5-20). The driven nip rollers size the web to the appropriate size before coating the active material onto the web.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the apparatus of Kejha with the driven nip rollers before the coating process as taught by Perman in order to appropriately size the metal web before future processing steps.

Kejha teaches a motor driven spool (5:14-20) but does not discuss the use of a slip clutch.

Kniazzeh teaches a method of making a battery. The driven take up spool is combined with a slip clutch to provide uniform tension on the web (Fig. 2; 6:10-20).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the driven take up spool of Kejha with the slip clutch of Kniazzeh in order to provide uniform tension in the web during the processing steps.

8. Claims 5-8, 10, 11, 21 & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,443,602 (Kejha) in view of US Patent 4,254,191 (Kniazzeh) and US Patent 4,318,430 (Perman) as applied to claims 28-31 above and further in view of US Patent 6,280,879 (Andersen).

The teachings of Kejha, Kniazzeh, Perman and Andersen as discussed above are incorporated herein. Furthermore, as discussed above, Kejha teaches masking the metal web.

Kejha is silent to a treating the metal web with a solvent resistant primer.

Andersen teaches treating a metal web with a solvent resistant primer. See the above rejection involving Andersen for a full discussion.

9. Claims 14 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,443,602 (Kejha) in view of US Patent 4,254,191 (Kniazzeh) and US Patent 4,318,430 (Perman) and US Patent 6,280,879 (Andersen) as applied to claims 5 & 6, and further in view of US Patent 5,230,906 (Mueller) and US Patent 3,694,392 (Werner).

The teachings of Kejha, Kniazzeh, Perman and Andersen as discussed above are incorporated herein.

Kejha, Kniazzeh, Perman and Andersen are silent to the primer containing lithium polysilicate and carbon black.

Werner teaches a primer for increasing adhesion of a fluorocarbon polymer coating to a substrate. See above rejection under Werner for a full discussion of the teachings.

Kejha, Kniazzeh, Perman and Andersen are silent to the process of applying the primer by way of dip-coating and then sequentially pulling the web over a horizontal roller.

Mueller teaches applying a liquid material to a web by means of dip coating and then sequentially passing the coated web over a roller horizontally (Fig. 1; 4:53-55, 5:50-55). See above rejection under Mueller for a full discussion of the teachings.

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,443,602 (Kejha) in view of US Patent 4,254,191 (Kniazzeh) and US Patent 4,318,430 (Perman) and US Patent 6,280,879 (Andersen) as applied to claims 5 & 6, and further in view of U.S. Patent No. 5,385,761 (Iwanaga).

The teachings of Kejha, Kniazzeh, Perman and Andersen as discussed above are incorporated herein.

Kejha, Kniazzeh, Perman and Andersen are silent to sandblasting to remove the mask.

Iwanaga teaches sandblasting to remove the mask after the electrode has been coated. See above rejection under Iwanaga for a full discussion of the reference and the combination.

11. Claims 12 & 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,443,602 (Kejha) in view of US Patent 4,254,191 (Kniazzeh) and US Patent 4,318,430 (Perman).

The teachings of Kejha, Kniazzeh, Perman and Andersen as discussed above are incorporated herein.

Kejha, Kniazzeh, Perman and Andersen are silent to removing the mask by buffing or sandblasting along with vacuuming.

Kejha teaches removing the masking by methods well known in the art (5:10-15). Buffing and sandblasting are well-known methods of removing unwanted material from a surface. The sandblasting provides a very clean surface with texture, which would create a desired surface for attaching another component. It would be obvious to one skilled in the art to use sandblasting as a means of removing the coating material in order to prep the surface for another process step. Furthermore, as no criticality is presented as to the method by which the mask is removed, it would be obvious to use any known method for this purpose. As for the vacuuming, it would be obvious to add a vacuum to the system to keep the unwanted material from contaminating other components of the apparatus or the product being produced.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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